



August 15, 2023

CERTIFIED MAIL NO. [REDACTED]

[REDACTED]
[REDACTED]
[REDACTED]

Re: Request for Investigation 367967
Stray Gas Migrating into Water Supply – Positive Determination
Beaver Township, Clarion County

[REDACTED] [REDACTED]

This letter is regarding your water supply listed in Exhibit A (“Water Supply”). The Pennsylvania Department of Environmental Protection’s (“Department’s”) investigation indicates that oil and gas activities impacted the Water Supply. This information is summarized below.

CASE INFORMATION

Date of Complaint	Nature of Complaint (odor, taste, quantity, use, color)	Sample Results Above Statewide Standards or Recommended Levels
October 24, 2022	Gas fumes and bad odor coming from water supply well	Free and dissolved gas in water supply, iron, manganese

WATER SAMPLE RESULTS

Parameter/Description	Statewide Standards	PADEP Pre-treatment sample 10/26/2022	PADEP Post-treatment sample 10/26/2022	PADEP Pre-treatment sample 3/15/2023	PADEP Post-treatment sample 3/15/2023
Alkalinity (mg/l)		28.4	42.0	9.8	12.4
Aluminum (ug/l)	200	25.200	<15.0	<15.0	<15.0
Arsenic (ug/l)	10	<3.00	<3.00	<3.00	<3.00
Barium (mg/l)	2	0.112	<0.010	0.092	<0.010
Bromide (mg/l)		<0.2	<0.2	<0.2	<0.2
Calcium (mg/l)		5.500	<0.100	3.193	<0.100
Hardness (mg/l)		25	0	18	0
Iron (mg/l)	0.3	10.800	0.227	6.144	<0.100
Lithium (ug/l)		<25.0	<25.0	<25.0	<25.0
Magnesium (mg/l)		2.77	<0.010	2.34	<0.010
Manganese (mg/l)	0.05	0.431	<0.010	0.398	<0.010
pH/field	6.5-8.5	6.10	Not tested	5.85	5.8

pH/lab	6.5-8.5	6.1	6.4	6.0	6.3
Potassium (mg/l)		1.70	<1.00	1.42	<1.00
Selenium (ug/l)	50	<4.00	<4.00	<4.00	<4.00
Sodium (mg/l)		1.58	62.90	2.59	12.20
Conductivity (umhos/cm)		69.50	441.00	65.50	63.00
Strontium (mg/l)		0.030	<0.010	0.012	<0.010
Chloride (mg/l)	250	5.79	110.92	8.41	8.51
TDS (mg/l)	500	754*	230*	46	50
Sulfate (mg/l)	250	5.96	6.85	4.11	4.10
TSS (mg/l)		<20	<20	<20	<20
Turbidity (ntu)	1 NTU (applicable only to unfiltered surface water sources)	36.36	2.97	9.29	<1
Zinc (ug/l)	5	<30.0	<30.0	<30.0	<30.0
Ethane (ug/l)		19.6	Not tested	Not detected	Not detected
Methane (ug/l)	Action level 7000 ug/l	307	Not tested	Not detected	Not detected
Propane (ug/l)		Not detected	Not tested	Not detected	Not detected

*- Holding Time Exceeded

INVESTIGATION SUMMARY

On October 24, 2022, you notified the Department that there was gas venting from your water well. During the previous day, you lost water and when the well cap was removed there was a bad odor and fumes could be seen coming from the water well. On October 24, 2022, the Department met with you and an oil and gas operator of a nearby gas well, the Kahle Hahn P217, API 031-01149 (“Hahn Gas Well”). The operator stated that they believed the Hahn Gas Well had a hole in the surface casing and that it was causing the gas migration.

On October 26, 2022, the Department collected samples from your Water Supply. During the site visit, 72% methane was detected in the Water Supply and 100% methane was detected venting from the production tubing of the Hahn Gas Well. Free gas samples were collected from the Water Supply and from the Hahn Gas Well. Water and dissolved gas samples were also collected from the Water Supply. The free gas and dissolved gas samples were sent to Isotech Laboratories LLC (“Isotech”) for compositional analysis and isotopic analysis of methane, ethane, and propane. Based on the sample results, the Hahn Gas Well could not be ruled out as a potential source of the gas found in the Water Supply.

The Hahn Gas Well was plugged in December of 2022. Free gas levels detected in the Water Supply decreased over the course of the investigation and reached near zero by February of 2023. The Water Supply was sampled again in March of 2023, and the lab analysis did not detect dissolved methane, ethane, or propane in the water samples.

Based on the review of geologic mapping, inspections of nearby gas wells, the monitoring of the Water Supply, and the water and gas sample results, the Department determines that the Water Supply was impacted by oil and gas activity. The Hahn Gas Well appears to have been the source of gas migrating into the Water Supply.

Low levels of free gas continue to be detected in the Water Supply and the Department recommends that the Water Supply remain vented. This will help alleviate the possibility of concentrating these gases in areas where ignition would pose a threat to life or property. Please note that it is not possible to completely eliminate the hazards of having natural gas in your Water Supply by simply venting your well. Please refer to the enclosed Fact Sheet: Methane Gas and Water Wells for additional information on venting water wells.

Although no gas was detected in the living space of your home, please be aware that methane levels can fluctuate. This means that even with a relatively low level of methane, you should be vigilant of changes in your water that could indicate an increase in methane concentration. Changing conditions can allow gas to migrate to basements and crawlspaces. Consequently, there is a physical danger of fire or explosion due to the migration of natural gas into water wells or through soils into dwellings where it could be ignited by sources that are present in most homes/buildings. Natural gas can also cause a threat of asphyxiation, although this is extremely rare. Please refer to the enclosed Fact Sheet: Methane Migration into Occupied Buildings for additional details on methane migration. Due to the absence of a crawlspace and basement in your home and other site-specific details, the Department does not anticipate issues with methane concentrating in your home.

In addition to the free and dissolved gas, the water sample results indicate that your water quality exceeds statewide standards for iron and manganese. Iron and manganese occur naturally in many water supplies in Western Pennsylvania due to the types of rocks the groundwater encounters as it flows to wells. These levels can naturally fluctuate throughout the year and can also fluctuate year over year due to climate variability and other influences. Based on the latest post-treatment sample of your Water Supply, your current water treatment is reducing the iron and manganese levels to statewide standards.

If you have any questions about any of the above, please contact Aaron O'Hara at 814-308-3118.

Sincerely,

Scott M. Dudzic

Scott Dudzic
Northwest District Oil and Gas Manager
District Oil and Gas Operations

Enclosures:

DEP Fact Sheet: Methane Gas and Water Wells
DEP Fact Sheet: Methane Migration into Occupied Buildings
PSU: Iron and Manganese in Private Water Systems

c: Joe Lichtinger (email)
Steve Lencer (email)
Dave Adams (email)
Kayla Despenes (email)
Aaron O'Hara (email)

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Exhibit A



Iron and Manganese in Private Water Systems

Iron and manganese are metals that occur frequently in private water systems in Pennsylvania. In some parts of the state these metals exist naturally in groundwater that originates from certain types of rock.

Sources of Iron and Manganese

Natural sources of iron and manganese are more common in deeper wells where the water has been in contact with rock for a longer time. In coal mining regions of the state, these metals may also occur from both deep and surface mining activities. Iron and manganese often occur together in groundwater but manganese usually occurs in much lower concentrations than iron.

Both iron and manganese are readily apparent in drinking water supplies. Both impart a strong metallic taste to the water and both cause staining. Water coming from wells and springs with high iron and/or manganese may appear colorless initially but orange-brown (iron) or black (manganese) stains or particles quickly appear as the water is exposed to oxygen (see [Water Testing](#)).

Although iron and manganese can occur in wells and springs throughout Pennsylvania, they are most common in northern and western counties. A survey by Penn State found excessive iron concentrations in 17% of the private water supplies sampled in the state.

Drinking Water Standards

Iron and manganese are not health concerns in drinking water. Instead, they both have secondary or recommended drinking water standards because they cause aesthetic problems that make the water undesirable to use in the home and a bitter metallic taste that can make the water unpleasant to drink for both humans and farm animals.

Iron can also cause an orange or brown stain in sinks and in the laundry. Manganese often results in a dense black stain or solid. For these reasons, it is recommended that drinking water have no more than 0.3 mg/L (or 0.3 parts per million) of iron and less than 0.05 mg/L of manganese. Remember that private water systems serving individual homes are not subject to state or federal drinking water standards. Thus, these standards only provide guidelines for the proper management of these types

of water supplies.

Water Testing

The presence of stains, particulates, and metallic taste often make it obvious that iron and manganese are present in a water supply even without water testing. Still, it is a good idea to have your water tested to determine the exact concentration of each of these metals. The concentration will determine the most practical and economical water treatment options to solve the problem.

In addition to the concentration, it is also important to determine the form of the iron and manganese. If water collected from the well or spring is initially clear but then forms orange-brown or black solid particles over time, the iron and manganese are dissolved in the water. This is known as the “reduced” form of these metals. Dissolved or reduced iron and manganese are most common in groundwater with a pH less than 7.0.

Sometimes, solid particles of iron and manganese will be apparent immediately in water from the well or spring. In this case, the metals are already in the oxidized form. This is more common in higher pH water supplies or where oxygen is readily available to the water, such as a shallow spring.

If you notice orange-brown or black stains with your water or a metallic taste, you should arrange to have your water tested for iron and/or manganese. Iron and manganese are common water pollutants that can be tested by many commercial laboratories in Pennsylvania. Have your water thoroughly tested at a DEP-accredited lab to make an overall treatment plan; see [Water Testing](#) for more information.

Removing Iron and Manganese from Water

Iron and manganese can be effectively removed from water using a number of treatment processes depending on both the form and concentration of the metals. Since iron and manganese are aesthetic problems that affect all potential uses of the water, they must be removed from all water entering the home using Point-of-Entry (POE) treatment devices.

When multiple treatment processes are applicable to your problem, make sure you shop around and compare treatment



units and prices among several reputable dealers that carry a variety of treatment devices. Be sure to understand the maintenance requirements for each unit and get a written warranty for any device you decide to purchase. See [Tips for Buying Water Treatment Equipment](#) for more guidance.

Water Softening (Ion Exchange)

Conventional water softeners are sometimes effective for removing iron and small amounts of manganese. Water softeners are typically used to remove calcium and magnesium hardness in water by an exchange process. The calcium and magnesium are removed from the water and sodium is added in their place. Iron and manganese removal is accomplished in the same way by exchanging the iron and manganese for sodium. The iron and manganese are then removed from the softener resin bed through backwashing and regeneration.

Removal efficiencies by softeners will vary depending on the iron concentration, water hardness and pH. Softeners are generally only recommended when the water pH is greater than 6.7, the water hardness is between 3 and 20 grains per gallon (50- 350 mg/L) and the dissolved iron concentration is less than 5 mg/L.

Oxidized forms of iron and manganese will foul the softener resin. Thus, it is critical that the raw water not come in contact with any oxidizing agents like air or chlorine before entering the softener. Using the softener resin bed as a mechanical filter for oxidized iron and manganese is generally not recommended. This could damage the resin bed and require much more frequent backwashing. If oxidized iron and/or manganese are present in the raw water, filtration should be used for removal.

Additional information about softeners and their maintenance is available in the article on [Water Softening](#).

Polyphosphate Addition

Water containing dissolved iron concentrations less than 2 mg/L may be treated using polyphosphate addition. Phosphate addition is generally ineffective in treating manganese. The phosphate is fed into the water using a chemical feed pump that often requires trial and error dose adjustments. In this case, the iron is surrounded or “sequestered” by the phosphate and is not actually removed from the water.

There are some major drawbacks to this process. Although the sequestered iron will not cause objectionable stains, it will still give the water a metallic taste. In addition, if too much phosphate is added to the water, it will give the water a slippery feeling and it may also cause diarrhea. The polyphosphate may also be degraded in a water heater resulting in release of sequestered iron.

Oxidizing Filters

Oxidizing filters both oxidize and filter iron and manganese in one unit. The filter is usually comprised of manganese treated greensand although other materials such as birm can also be used. In the case of a manganese greensand filter, the filter media is treated with potassium permanganate to form a coating that oxidizes the dissolved iron and manganese and then filters them out of the water. Because these units combine oxidation and filtration, they can be used to treat raw water with dissolved and/or oxidized iron and manganese.

Manganese greensand filters require significant maintenance including frequent regeneration with a potassium permanganate solution as it is consumed during oxidation of the dissolved metals. In addition, these units require regular backwashing to remove the oxidized iron and manganese particles. The potassium permanganate solution used for regeneration is toxic and must be handled and stored carefully using specific safety measures.

When properly maintained manganese greensand filters are extremely efficient for moderate levels of both dissolved and oxidized iron and manganese. They are generally recommended when the combined iron and manganese concentration is in the range of 3 to 10 mg/L. Keep in mind that the frequency of maintenance (backwashing and regeneration) will increase as the metals concentration increases.

Birm filters are similar to manganese greensand but they do not require regeneration because they utilize oxygen present in the raw water to oxidize the metals. As a result, the raw water must contain a certain amount of dissolved oxygen and the pH should be at least 6.8 for iron removal and 7.5 for manganese removal. Even under ideal conditions, manganese removal efficiency is highly variable with birm filters. Birm filters do require backwashing to remove accumulated oxidized metal particles.

Oxidation Followed by Filtration

When combined levels of iron and manganese exceed 10 mg/L, the most effective treatment involves oxidation followed by filtration. In this process, a chemical is added to convert any dissolved iron and manganese into the solid, oxidized forms that can then be easily filtered from the water. Chlorine is most commonly used as the oxidant although potassium permanganate and hydrogen peroxide can also be used. A small chemical feed pump is used to feed the chlorine (usually sodium hypochlorite) solution into the water upstream from a mixing tank or coil of plastic pipe. The mixing tank or pipe coil is necessary to provide contact time for the iron and manganese precipitates to form. It may be necessary to install an activated carbon filter to remove the objectionable taste and odor from the residual chlorine. Chlorine is not recommended as an oxidant for very high manganese levels because a very high pH is necessary to completely oxidize the manganese.

Significant system maintenance is required with these units. Solution tanks must be routinely refilled and mechanical filters need to be backwashed to remove accumulated iron and

manganese particles. If a carbon filter is also installed, the carbon would need to be replaced occasionally as it becomes exhausted. The frequency of maintenance is primarily determined by the concentration of the metals in the raw water and the amount of water used.

Other Treatment Methods

The methods described above are the most common processes for removing iron and manganese but others like aeration, ozonation, and catalytic carbon may also be effective. While these units may successfully treat iron and/or manganese, their cost should be carefully compared with more traditional treatment methods and, as always, you should obtain a written guarantee of their effectiveness.

Aeration units may work by cascading, bubbling, or stripping the gas from the water. Aeration may be advantageous because it does not add chemicals to the water. Maintenance costs are low for aeration units but the initial purchase costs are often higher than other treatment options. Aeration units also require a filter for removal of the oxidized iron and manganese which must be backwashed. The water should also be disinfected to keep bacteria from colonizing the aerator.

Catalytic carbon adsorbs then oxidizes and filters dissolved iron in one unit. It is effective for concentrations of dissolved iron less than 1.0 mg/L. Maintenance requirements are less than oxidizing filters because no chemicals are added, but backwashing is still necessary. Catalytic carbon requires a minimum of 4.0 mg/L of dissolved oxygen in the source water. Some groundwater supplies may need pretreatment to increase the dissolved oxygen concentration.

In recent years, ozonation has received more attention as a method for treating numerous water quality problems. Like chlorine, ozone is a strong oxidant but it is a much more unstable gas that must be generated on-site using electricity. Once the ozone is produced, it is injected into the water where it oxidizes dissolved metals which must then be filtered. Ozone units are usually more expensive than other more conventional treatment options but they may be useful where multiple water quality problems must be treated (i.e. bacteria and metals).

Other Options for Avoiding Iron and Manganese

While treatment devices are available to reduce iron and manganese from water, other options should not be overlooked. In some cases, a municipal water supply line may be nearby. Hooking into a municipal water supply may seem expensive initially but it may be economically preferable given the long-term costs and hassles associated with purchasing and maintaining a water treatment device. Hooking into a municipal water supply will also usually increase the real estate value of your home.

Another option may be to develop an alternate private water supply. Other sources of water like a shallow groundwater spring or a rainwater cistern could be developed to avoid iron

and manganese but they may both present other water quality and quantity problems. Alternative sources of water should be thoroughly investigated along with treatment options when choosing a strategy to avoid iron and manganese in water.

Prepared by Bryan R. Swistock, Extension Associate, William E. Sharpe, Professor of Forest Hydrology, and Paul D. Robillard, Associate Professor of Agricultural Engineering

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Methane Gas and Water Wells

Residents of the coal and natural gas-producing regions of Pennsylvania need to be aware of the potential dangers resulting from the accumulation of microbial gas, coal bed methane or natural gas in their water wells.

High concentrations of methane in water wells, water well enclosures and other confined spaces could cause an explosion.

What is Methane?

Methane (CH₄) is a naturally occurring hydrocarbon gas found underground. It is present in shallow and deep coal beds as well as in other rock units, and it is the main hydrocarbon found in natural gas and coal beds. Methane can occur as a gas or dissolved in the groundwater, or as a gas in the soil and rock zones below the surface.

Methane migrates from areas of high pressure to areas of low pressure. Mining and well drilling operations can affect the pressure in the subsurface and cause the migration of methane to areas of lower pressure, such as shallow aquifers and water wells used as water supplies. Gas migration in the subsurface can also be influenced by an increase or decrease in the water level of an aquifer, atmospheric pressure changes and other natural processes.

Active underground mining operations can lower groundwater levels, reducing pressure in aquifers occurring above and adjacent to the area of coal extraction. This reduction in pressure can allow gases within the overlying rock layers to migrate into nearby water wells. Methane can also be released from abandoned deep mines and from active and/or abandoned gas wells that are prone to leakage. Additionally, improperly constructed operating gas wells may mobilize methane in the subsurface. Releases from these and other sources can also migrate into nearby water wells.

Methane can migrate into water wells in a gaseous phase or dissolved in the groundwater. At atmospheric pressure, methane is soluble in water between 26-35 milligrams per liter. It is sometimes recognizable as effervescent gas bubbles in water drawn from a faucet. In some cases, the release of methane in a water well may be recognized by a sound similar to that of boiling water. However, methane is a colorless and odorless gas, and it may accumulate undetected in water wellbores and water well enclosures that are not properly vented. Methane may also move into basements of homes and other structures through plumbing and piping containing electrical connections. These conditions could lead to an explosion.

What to Do?

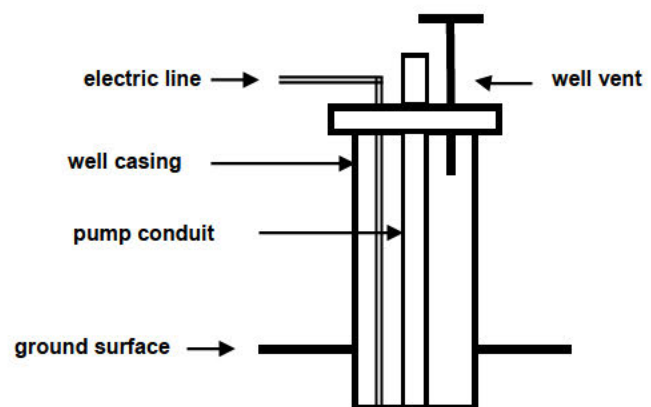
Methane gas is lighter than air with a specific gravity of 0.555, so it will not accumulate in the water wellbore if the water well is adequately vented to the atmosphere. Venting is an inexpensive and effective way to mitigate methane accumulation in water wells, water well enclosures and other confined spaces, such as basements. Proper venting reduces the potential for methane gas to seep into homes or structures from water wells.

Recommended Venting Procedures

Proper design is extremely important. Water well vents should be installed by a qualified water well driller or plumber.

The vent should extend above any possible flood level, potential ignition sources and areas of exposure (above the roof line for water wells adjacent to buildings), and it should have watertight connections to prevent surface water from entering. The well vent should be at least one (1) inch diameter or larger to facilitate gas flow. The end of the vent pipe should have a down-turned "gooseneck" or "T" and be capped with corrosion-resistant screening. If the vent is not screened, it can become a potential entry point for debris and small animals.

If concentrations in a vent pipe happen to exceed the lower explosive limit for methane (5 percent methane in air), installation of a spark-arresting cap at the end of the pipe should be considered. In addition, conduits from the water well that carry electrical lines or waterlines into the building should be sealed so that the air in the conduit



does not vent into the building. Venting of wells will not adequately remove methane dissolved in the groundwater, but properly designed water aeration systems are one effective way to lower the concentration of methane dissolved in the water.

Enclosed Wells

When the top of the water well is buried in a covered pit or enclosed in a basement, the vent pipe must vent gas to the outside air, as shown in the diagram at right.

The vent pipe should be screened and extend above any possible flood level, roof line, potential ignition sources and areas of exposure.

In cases where the water well is located in an enclosure, it should have a tight-fitting well cap, and all openings through the cap should be properly sealed to prevent methane from escaping into the water well enclosure.

Play It Safe

When a water well is no longer in service, the plumbing connections should be disconnected and sealed to prevent methane from entering the home or building.

NOTE: Water wells may differ considerably from the wells depicted in the diagrams. Also, well-venting requirements may vary from place to place because of differences in local plumbing codes. Therefore, water well owners are encouraged to contact a professional water well specialist or a local building code enforcement officer to determine the proper venting procedures required under the local plumbing code.

For more information on methane and water wells, please contact the local DEP office:

Southwest Regional Office

400 Waterfront Drive
Pittsburgh, PA 15222-4745
Telephone: 412-442-4000

Counties Served: Allegheny, Armstrong, Beaver, Cambria, Fayette, Greene, Indiana, Somerset, Washington and Westmoreland

South-central Regional Office

909 Elmerton Ave.
Harrisburg, PA 17110-8200
Telephone: 877-333-1904

Counties Served: Adams, Bedford, Berks, Blair, Cumberland, Dauphin, Franklin, Fulton, Huntingdon, Juniata, Lancaster, Lebanon, Mifflin, Perry and York

Southeast Regional Office

2 E. Main St.
Norristown, PA 19401-4915
Telephone: 484-250-5900

Counties Served: Bucks, Chester, Delaware, Montgomery and Philadelphia

Northwest Regional Office

230 Chestnut St.
Meadville, PA 16335-3481
Telephone: 814-332-6945

Counties Served: Butler, Clarion, Crawford, Elk, Erie, Forest, Jefferson, Lawrence, McKean, Mercer, Venango and Warren

North-central Regional Office

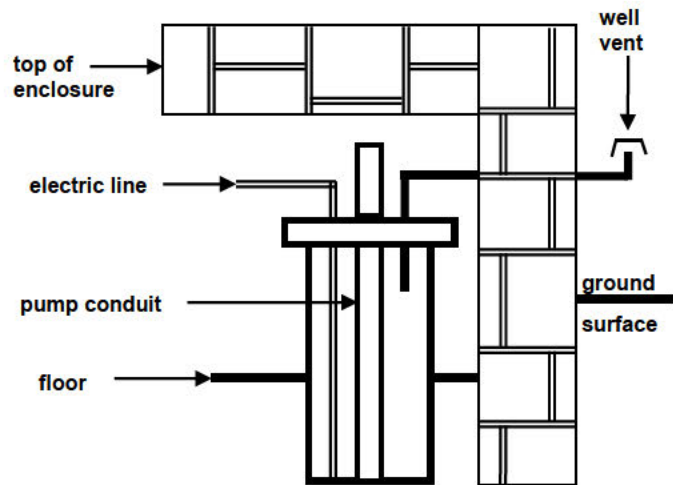
208 W. Third St., Suite 101
Williamsport, PA 17701-6448
Telephone: 570-327-3636

Counties Served: Bradford, Cameron, Centre, Clearfield, Clinton, Columbia, Lycoming, Montour, Northumberland, Potter, Snyder, Sullivan, Tioga and Union

Northeast Regional Office

2 Public Square
Wilkes-Barre, PA 18701-1915
Telephone: 570-826-2511

Counties Served: Carbon, Lackawanna, Lehigh, Luzerne, Monroe, Northampton, Pike, Schuylkill, Susquehanna, Wayne and Wyoming



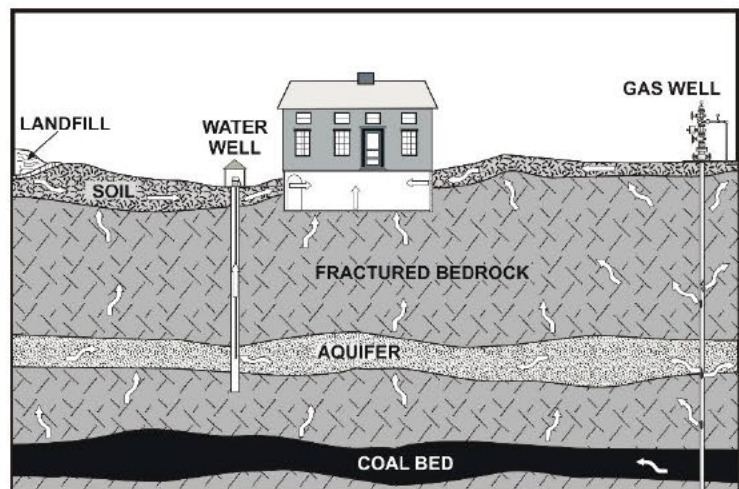
For more information, visit www.dep.state.pa.us, keyword: Wells.

Methane Migration into Occupied Buildings

Recovery and utilization of Pennsylvania's mineral resources by mining and drilling for oil and gas has a long history that continues today with the extraction of natural gas from the Marcellus Shale and other formations. These activities can directly or indirectly increase levels of methane gas in buildings from deeper sources such as coalbed methane or other geologic formations, or shallower sources in soil and groundwater. Although modern mining and well drilling practices have reduced the risk of environmental impacts; releases from wells, pipelines, and deep mines can and do occur. Methane migration can also occur naturally or in response to other human activities such as water well drilling or landfilling. The prevalence and amount of methane in the subsurface varies across the state depending on many factors. When gases migrating in the soil or water come into contact with man-made structures, the resulting accumulation of gas can cause unsafe conditions for building occupants.

What is Methane and How Is It Mobilized?

Methane (CH₄) is a naturally-occurring hydrocarbon gas found underground. It is lighter than air, colorless, odorless, and flammable. Methane is present in shallow organic-rich deposits and deep coal beds as well as other rock units, and is the primary hydrocarbon found in natural gas and coalbed gas. Gas migration may cause methane to accumulate undetected inside basements of homes and other structures. Mobilized gas can enter man-made structures through utility connections, porous surfaces, and basement walls. These conditions may present a life-threatening safety hazard and could lead to an explosion.



Methane migrates from high-pressure to low-pressure areas through available pathways. Migration through rock is typically slow. Fractures in the rock provide faster migration pathways. Mining and well drilling operations can affect the pressure as well as increase the pathways in the subsurface, allowing the migration of methane to areas of lower-pressure such as shallow aquifers and water wells. Gas migration in the subsurface can also be influenced by an increase or decrease in the water level of an aquifer. Active underground mining operations can lower groundwater levels, reducing pressure in aquifers occurring above and adjacent to the area of coal extraction. This reduction in pressure can allow gases within the overlying rock layers to migrate into nearby water wells or enclosed structures. Methane can also be released from abandoned deep mines and abandoned gas wells. The Department of Environmental Protection (DEP) has no evidence that the well completion process of hydraulic fracturing alone creates a pathway for methane to communicate with groundwater.

Gas Migration Investigations

DEP Oil and Gas Well regulations (25 Pa. Code, Chapters 78 and 78a) and DEP policy require a timely investigation into complaints alleging impacts to water supplies from oil and gas drilling. All complaint information reported to DEP is kept confidential. The purpose of the investigation is to determine the nature of the incident, assess the potential for hazards to public safety, and mitigate any hazard posed by concentrations of stray natural gas. When investigations are conducted by DEP and/or by an oil or gas operator, they typically include a site visit and interview; a field survey; and, if necessary, monitoring at potential sources, potentially impacted structures, and the subsurface. DEP uses multiple sources of evidence to determine if methane migration or other impacts to water supplies are attributable to drilling. This includes working to identify the origin of the gas through various methods which may include chemical

and isotopic gas analysis, evaluating nearby gas well integrity through pressure and well logging, tests and understanding the local geology and its relationship to the water supply in question.

Detailed investigations to confirm the source(s) of impacts to water supplies or the interior of a structure are time consuming and often require soil, water, and air sample collection for chemical analysis. DEP reviews the results of investigations conducted by oil and gas operators, consultants, and others; provides technical assistance and may conduct an independent investigation. When investigations indicate the need for engineering controls to mitigate impacts, DEP works with all involved parties to ensure that timely, effective solutions are implemented. DEP will also issue temporary water supply replacement orders as necessary during investigations.

Public Health and Safety

If methane gas infiltrates any enclosed structure, it can build up to dangerous levels. Concentrations of methane at five percent in air constitute an explosion hazard. A spark from a furnace or a faulty wire, a cigarette or a lit match can cause the gas to explode. Oil and gas industry professionals, local fire departments, and DEP staff are trained in the use of methane gas meters and explosimeters that measure airborne gas concentrations. As a safety precaution, DEP recommends that occupants vacate any building that has methane concentrations at 10 percent or greater of the lower explosive limit (0.5 percent methane in air). There are no known health impacts from drinking water that contains methane, nor is there an established federal safe drinking water level for methane.

Protections of Private Water Supplies

In cases where water supplies near oil and gas wells have been impacted by gas migration, there are significant enhanced protections for those water supply owners, including a presumption that the operator of the nearby oil or gas well is liable for the impact. This presumption applies if the water supply is within 2,500 feet of the vertical wellbore and the pollution occurs within one year from unconventional well drilling and completion of hydraulic fracturing. For conventional well drilling, the presumption of liability applies within 1,000 feet of the well and six months of the completion of drilling or alteration. Operators may rebut the presumption of liability by raising one of several defenses, including demonstrating the impact was pre-existing or not due to drilling-related activities.

Should DEP determine that an operator has impacted a water supply (regardless of the distance or time limitations of the presumption), the law requires those operators to restore or replace the water supply to its pre-existing condition or to federal safe drinking water standards, whichever is of higher quality.

DEP encourages you to report any cases of suspected water contamination that may be associated with the development of oil and gas resources or any other environmental complaint, please call toll-free 1-866-255-5158. For more information on methane gas migration, please contact the DEP office in your area.

Southwest Regional Office

400 Waterfront Dr.
Pittsburgh, PA 15222-4745
Telephone No. 412-442-4000

South-central Regional Office

909 Elmerton Avenue
Harrisburg, PA 17110-8200
Telephone No. 877-333-1904

Southeast Regional Office

2 East Main Street
Norristown, PA 19401-4915
Telephone No. 484-250-5900

Northwest Regional Office

230 Chestnut Street
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208 West Third Street, Suite 101
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Wilkes-Barre, PA 18701-1915
Telephone No. 570-826-2511

For more information, visit www.dep.pa.gov.

SENDER: COMPLETE THIS SECTION

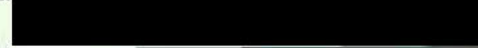
- Complete items 1, 2, and 3.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:



9590 9402 7132 1251 4025 87

2. Article Number (Transfer from service label)



COMPLETE THIS SECTION ON DELIVERY

- Agent
- Addressee

C. Date of Delivery
8-18-2

17 Yes

No

If Yes, enter delivery address below:

RECEIVED

AUG 21 2023

Environmental Protection
Northwest Regional Office

3. Service Type

- Adult Signature
- Adult Signature Restricted Delivery
- Certified Mail®
- Certified Mail Restricted Delivery
- Collect on Delivery
- Collect on Delivery Restricted Delivery
- Insured Mail
- Insured Mail Restricted Delivery (over \$500)
- Priority Mail Express®
- Registered Mail™
- Registered Mail Restricted Delivery
- Signature Confirmation™
- Signature Confirmation Restricted Delivery

PS Form 3811, July 2020 PSN 7530-02-000-9053

Lichtinger / O'Hara Domestic Return Receipt

USPS TRACKING#

PITTSBURGH PA 150



9590 9402 7132 1251 4025 87

United States
Postal Service

First-Class Mail
Postage & Fees Paid
USPS
Permit No. G-10

* Sender: Please print your name, address, and ZIP+4® in this box*

DEPARTMENT OF ENVIRONMENTAL PROTECTION
OIL & GAS MANAGEMENT
230 CHESTNUT ST
MEADVILLE PA 16335-3407

340730

